



Water Quality Targets

Set of Targets

- Target for each of the impaired waters
- Target may vary – do not need to use the same target of each of the waters

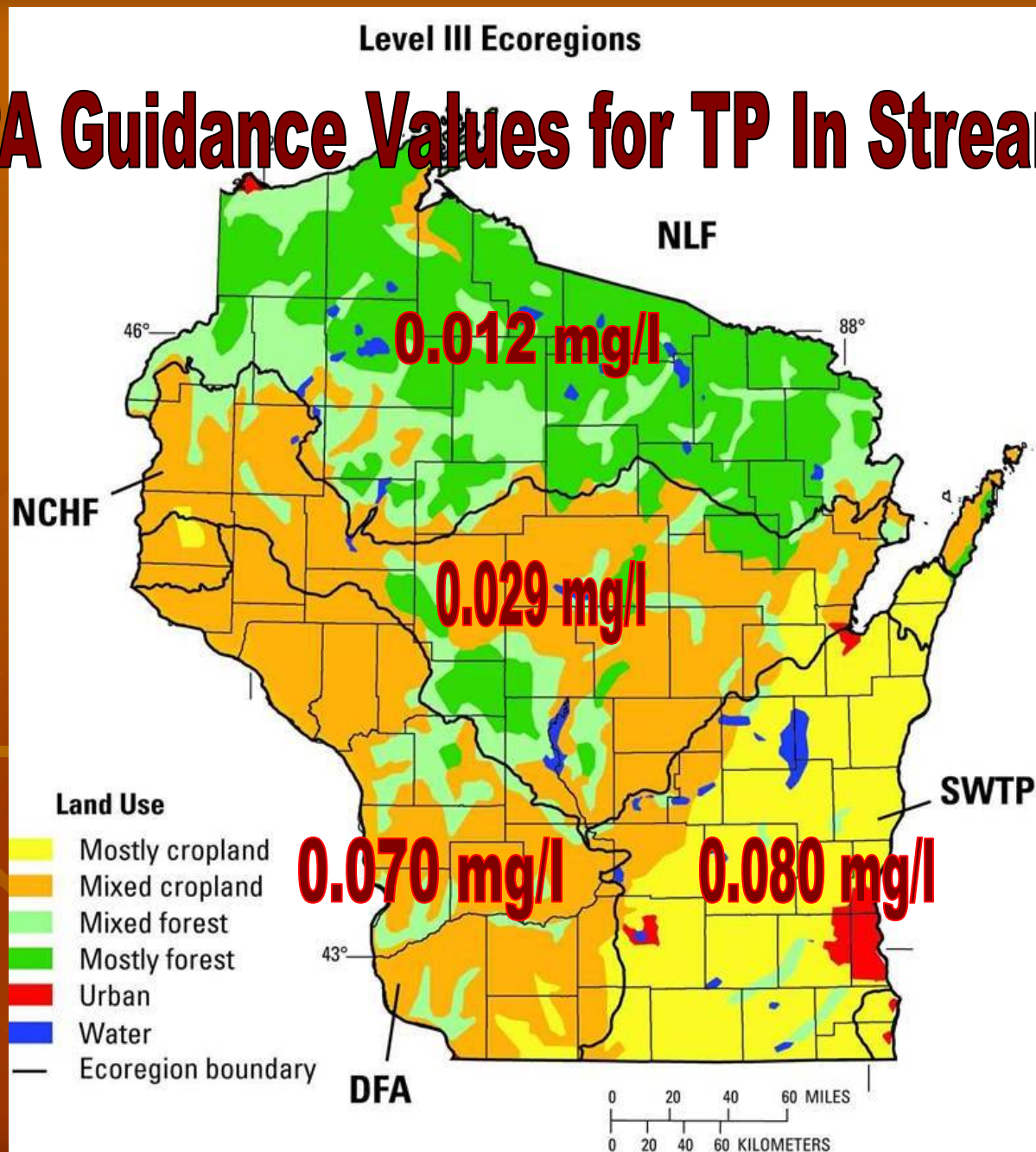
When using narrative criteria in TMDL development ...

- State must assign numeric values

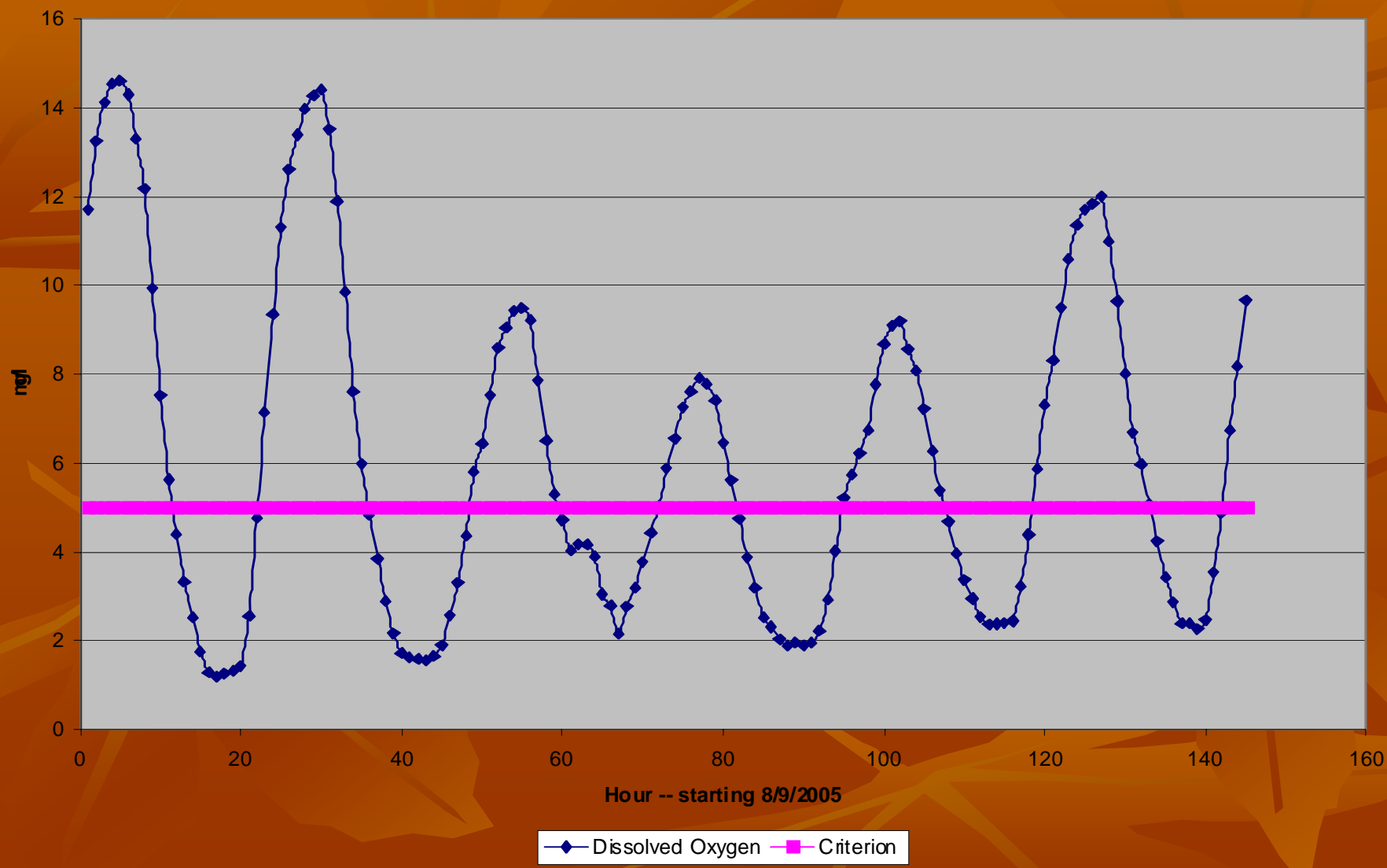
Methods of assigning numeric values

- EPA Sub-ecoregion guidance values
- Relationship to other water quality parameters
- Comparison to similar waters
- Reference conditions
- Effects based – most highly related factors

EPA Guidance Values for TP In Streams

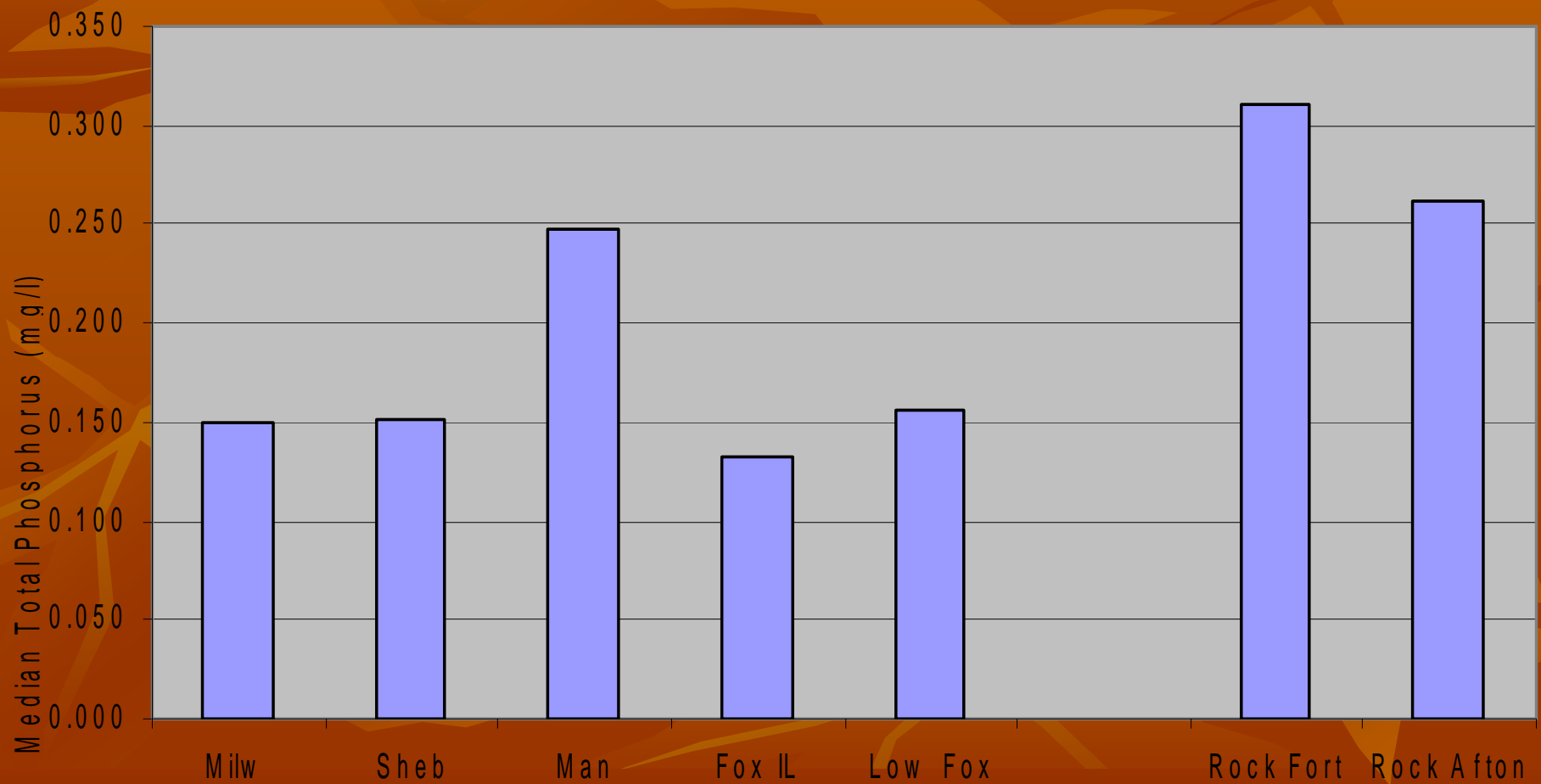


Turtle Creek -- Dissolved Oxygen



Similar Rivers

2003 Data on Southeast Wisconsin Rivers



Breakpoints / Thresholds for Biological Response

Thresholds or break points in the response in water quality and various biological indices to changes in Phosphorus concentrations (in mg/L)

Biological Indices	Total Phosphorus
Water Quality	
Secchi Depth	0.106
Suspended Chlorophyll	0.070
Benthic Chlorophyll and Diatoms	
Benthic Chlorophyll	0.039
Nutrient Index	0.057
Siltation Index	0.074
Biotic Index	0.072
Macroinvertebrates	
Hilsenhoff Biotic Index	0.088
Percent EPT individuals	0.087
Percent EPT taxa	0.091
Fish	
Fish Index of Biotic Integrity	0.055
Percent carnivorous fish	0.055
Percent intolerant fish	0.067

Range
0.039 – 0.106 mg/L

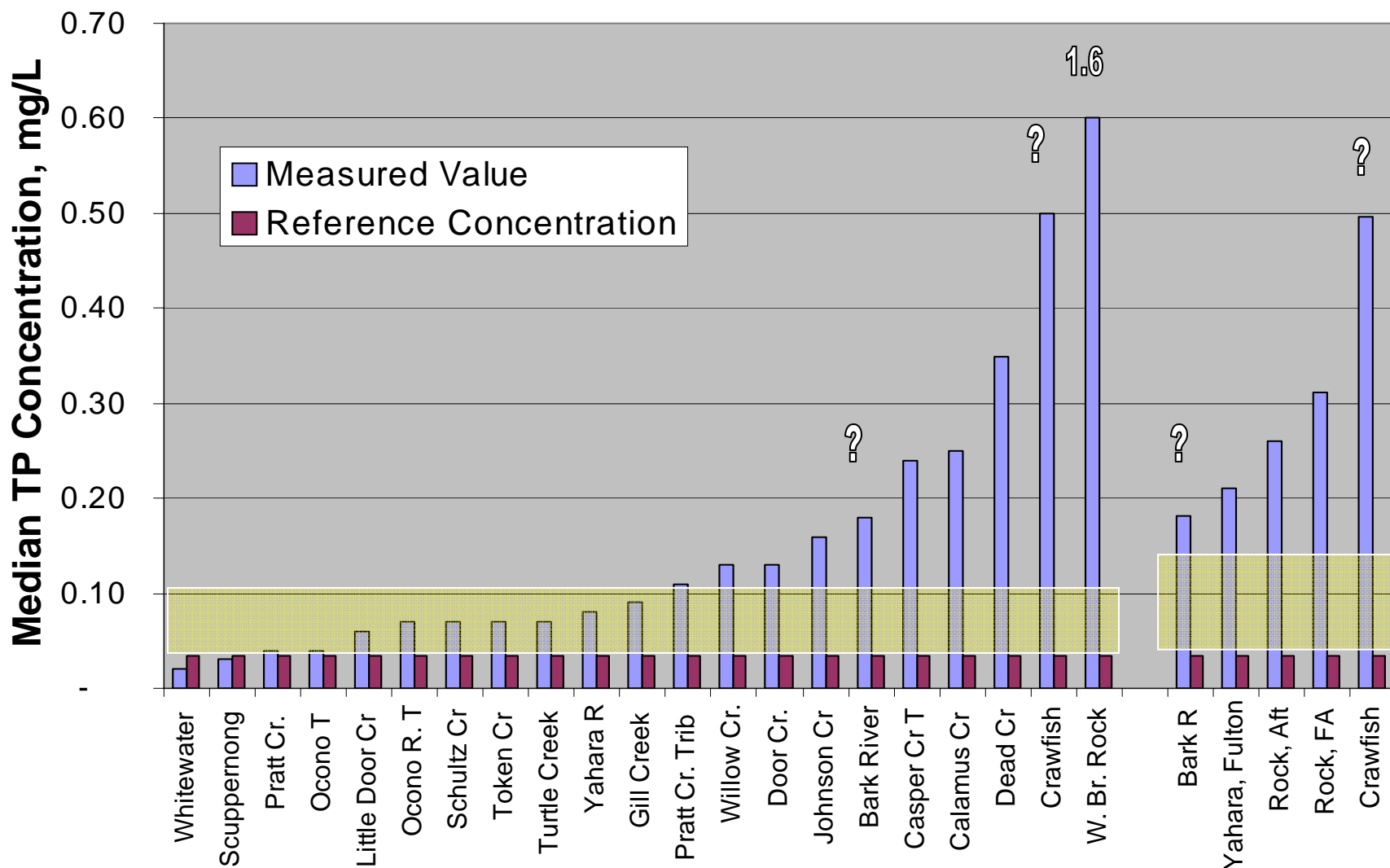
Breakpoints / Thresholds for Biological Response

Thresholds or break points in the responses in water quality and various biological indices to changes in Total Phosphorus concentrations for nonwadeable streams in Wisconsin

Biological Indices	Total Phosphorus
Water Quality	
Secchi Depth	0.091
Suspended Chl. - Log	0.064
Macroinvertebrates	
Species richness	0.150
Mean pollution tolerance index	0.064
Percent of individuals from order Ephemeroptera	0.040
Hilsenhoff biotic index	0.150
Percent of individuals from order Plecoptera	0.148
Percent of individuals that are scrapers	0.034
Fish	
Wisconsin large river index of biotic integrity	0.139
Percent of Weight that is Suckers	0.091
Number of Intolerant Species	0.139
Percent of individuals that are river species	0.079
Number of River Species	0.147
Percent of individuals that are lithophilic spawners	0.055

Range
0.04 – 0.15 mg/L

Total Phosphorus in Rock River Tributaries Mainstem



Method Used

- Non-wadeable
 - For each subcategory – Water Chemistry, Benthic algae, Macroinvertebrates and Fish:
 - Spearman Rank weighted average for breakpoints
 - Average of weighted averages
- Wadeable
 - Similar, but limited to top two correlations for fish and macroinvertebrates
 - Will need to add water chemistry in future

Results for Total Phosphorus

- Wadeable = 0.08 mg/l
- Non-wadeable = 0.125 mg/l

Rock River at Fort Atkinson and Afton

